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Air Pollution May Trigger Asthma in Young Athletes

Children who compete in several sports and live in high-ozone areas have a higher risk of respiratory condition, USC study shows

LOS ANGELES, Jan. 31—Children who compete in sports in communities with more heavily polluted air are more likely to be diagnosed with asthma than other children, according to research from the Keck School of Medicine of USC.

Children in communities with high average ozone levels who compete in three or more team sports have a three-to-four-times higher risk of developing the respiratory illness than non-athletic kids, researchers report in the Feb. 2 issue of *The Lancet*. The more sports children participate in, the greater the effect.

"This research suggests that contrary to conventional wisdom, ozone is involved in the causation of asthma," says Rob McConnell, M.D., associate professor of preventive medicine at the Keck School and lead author of the study. Air pollution has been thought to worsen existing asthma, but not cause it.

Although asthma is the most common chronic disease of childhood, and the disease has been becoming more common for several decades, this is the first study to examine athletic activity, air pollution and the development of new-onset asthma.

"Identifying potential causes of asthma is very important because eliminating the causative factors can prevent this life-threatening disease," says John Peters, M.D., D.Sc., M.P.H., Hastings Professor of Preventive Medicine at the Keck School.

The research is part of the USC-led Children's Health Study, an extensive investigation into pollution and kids' respiratory health. Environmental health researchers have tracked levels of major pollutants and monitored the respiratory health of more than 6,000 children in a dozen Southern California communities since 1993.

For the *Lancet* study, researchers monitored about 3,500 of these children. Children with no history of asthma were recruited from the fourth grade (age 9 or 10), seventh grade (age 12 or 13) and tenth grade (age 15 or 16) and were tracked for up to five years.

Interviewers asked children about sports at the beginning of the study: whether they had participated in sports in the past year; how many sports; and what kinds. Sports included

basketball, football, soccer, swimming, tennis, baseball/softball, volleyball and others. They also asked every year if a doctor had diagnosed them with asthma.

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Researchers also measured air pollution—mostly from vehicle emissions—in each community. They monitored hourly levels of ozone, particulate matter (dust and smoke), nitrogen dioxide and acid. Using the measurements, they divided the communities into two groups: low-pollution areas and high-pollution areas.

Over five years of follow-up, 265 of the children were diagnosed with asthma. Overall, children playing team sports were more likely to develop asthma. In communities with high levels of ozone, researchers saw a trend of increasing asthma with the number of team sports children played.

"Somewhat to our surprise, in low-ozone communities, we found no increased risk of asthma in children who played team sports," McConnell says.

The sports-ozone-asthma link was not explained by children's socioeconomic status, history of allergy, family history of asthma or other risk factors. Also, most children who were diagnosed with asthma had no history of wheezing. That means the children probably did not have previously undiagnosed asthma, which might have been made worse by ozone to the point it was diagnosed. Rather, these children developed new cases of asthma.

Children doing several team sports are more likely to be serious athletes. "Team sports are an indicator of kids who do a lot of physical activity," he says. "They're breathing more ozone than a kid sitting in front of a TV inside the house."

Athletes get a higher dose of pollutants to the lung, because they must breathe rapidly and deeply. In addition, most sports are played outside, where ozone concentrations rise higher than indoors.

McConnell cautions parents to be cognizant of air pollution levels when their children are exercising heavily outdoors.

"The bottom line is this: exercise is really healthy for children, for many reasons, and children should be encouraged to play team sports," he says. "But, on days when air pollution levels are expected to be high, children should limit prolonged outdoor exertion. Air quality forecasts can be found in newspapers, and on days when unhealthy air quality is predicted, state agencies send alerts to schools. If ozone is causing asthma then, ultimately, the solution is to reduce the levels of ozone."

Parents concerned about their children's respiratory health should discuss asthma and related issues with a physician or pediatrician, McConnell suggests.

The study did not exclude the possibility that other pollutants such as particulate matter and nitrogen dioxide also might play a role in asthma. Researchers plan further studies to better understand risk factors in athletes for asthma.

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Rob McConnell, Kiros Berhane, Frank D. Gilliland, Stephanie J. London, Talat Islam, W. James Gauderman, Edward Avol, Helene G. Margolis and John M. Peters. "Asthma in Exercising Children Exposed to Ozone," *The Lancet*, Vol. 359, No. 9304, Feb. 2, 2002.